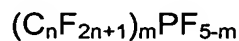


## PATENT CLAIMS

1. Process for the preparation of monohydroperfluoroalkanes, bis(per-  
fluoroalkyl)phosphinates and perfluoroalkylphosphonates, comprising at  
5 least the treatment of at least one perfluoroalkylphosphorane with at  
least one base and, if desired, an acid in a suitable reaction medium.
2. Process for the preparation of monohydroperfluoroalkanes according to  
Claim 1, characterised in that at least one perfluoroalkylphosphorane is  
10 reacted with at least one base (a) or an organometallic compound in a  
suitable solvent.
3. Process for the preparation of bis(perfluoroalkyl)phosphinates and per-  
fluoroalkylphosphonates according to Claim 1, characterised in that at  
15 least one perfluoroalkylphosphorane is reacted with at least one inor-  
ganic base (b) in a suitable solvent, the bis(perfluoroalkyl)phosphinates  
and perfluoroalkylphosphonates formed in addition to the monohydro-  
perfluoroalkanes are converted into the corresponding bis(perfluoro-  
alkyl)phosphinic acids and perfluoroalkylphosphonic acids directly or  
20 after isolation by salt interchange or subsequent treatment with an acid,  
preferably sulfuric acid, and the salts are obtained by subsequent neu-  
tralisation, preferably using organic bases (c).
4. Process according to Claim 1, characterised in that the perfluoroalkyl-  
25 phosphorane employed is a compound of the general formula I



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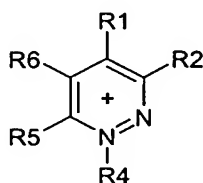
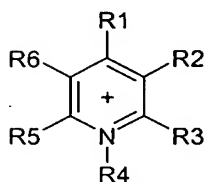
in which  $1 \leq n \leq 8$ , preferably  $1 \leq n \leq 4$ , and m in each case denotes 1, 2 or 3.

- 5 5. Process according to Claim 1, characterised in that the perfluoroalkyl-phosphorane is selected from the group consisting of difluorotris(pentafluoroethyl)phosphorane, difluorotris(n-nonafluorobutyl)phosphorane, difluorotris(n-heptafluoropropyl)phosphorane and trifluorobis(n-nonafluorobutyl)phosphorane.
- 10 6. Process according to Claim 2 or 3, characterised in that the base (a) or (c) employed is at least one organic base.
- 15 7. Process according to Claim 6, characterised in that the organic base(s) is (are) selected from the group consisting of alkylammonium hydroxides, arylammonium hydroxides, alkylaryl ammonium hydroxides, alkylphosphonium hydroxides, arylphosphonium hydroxides, alkylarylphosphonium hydroxides, alkylamines, arylamines, alkylaryl amines, alkylphosphines, arylphosphines and alkylarylphosphines.
- 20 8. Process according to Claim 2 or 3, characterised in that at least one inorganic base (a) or (b) is employed.
- 25 9. Process according to Claim 8, characterised in that the inorganic base(s) is (are) selected from the group consisting of alkali metal hydroxides and alkaline earth metal hydroxides.
- 30 10. Process according to Claim 9, characterised in that the alkali metal hydroxide is selected from the group consisting of lithium hydroxide, lithium hydroxide monohydrate, sodium hydroxide and potassium hydroxide.

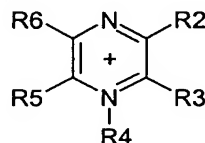
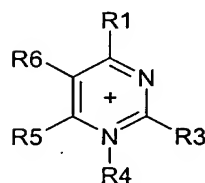
11. Process according to Claim 9, characterised in that the alkaline earth metal hydroxide is selected from the group consisting of barium hydroxide, barium hydroxide octahydrate and calcium hydroxide.
- 5 12. Process according to Claim 2, characterised in that the organometallic compounds are selected from the group consisting of metal alkoxides, preferably alkali metal alkoxides, metal aryloxides, metal alkylthio-oxides, metal arylthiooxides, alkylmetal compounds, arylmetal compounds and Grignard reagents.
- 10 13. Process according to Claim 1, characterised in that the reaction medium is water, if desired mixed with one or more organic solvents.
- 15 14. Process according to Claim 1, characterised in that the reaction medium employed is one or more organic solvents.
- 20 15. Process according to Claim 13 or 14, characterised in that the organic solvent is selected from the group consisting of alcohols, ethers, acyl-amides, sulfoxides, sulfones, nitriles and hydrocarbons.
- 25 16. Process according to Claim 15, characterised in that the alcohol has from one to four carbon atoms in the alkyl moiety and is preferably selected from the group consisting of methanol, ethanol, isopropanol and mixtures of at least two of these alcohols.
- 30 17. Perfluoroalkylphosphonates and bis(perfluoroalkyl)phosphinates selected from the group consisting of partially alkylated and peralkylated ammonium, phosphonium, sulfonium, pyridinium, pyridazinium, pyrimidinium, pyrazinium, imidazolium, pyrazolium, thiazolium, oxazolium and triazolium salts.

18. Perfluoroalkylphosphonates and bis(perfluoroalkyl)phosphinates according to Claim 16, having a cation selected from the group consisting of

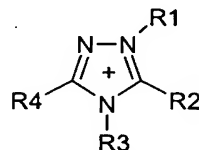
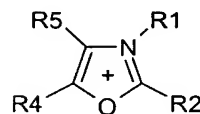
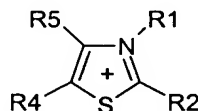
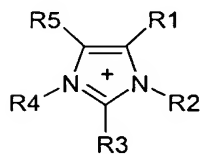
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where  $R^1$  to  $R^5$  are identical or different, are optionally bonded directly to one another via a single or double bond and are each, individually or together, defined as follows:

- H,

- halogen, where the halogens are not bonded directly to N,

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- an alkyl radical ( $C_1$  to  $C_8$ ), which may be partially or completely substituted by further groups, preferably F, Cl,  $N(C_nF_{(2n+1-x)}H_x)_2$ ,  $O(C_nF_{(2n+1-x)}H_x)$ ,  $SO_2(C_nF_{(2n+1-x)}H_x)$ ,  $C_nF_{(2n+1-x)}H_x$ , where  $1 < n < 6$  and  $0 < x \leq 2n+1$ .

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19. Use of the perfluoroalkylphosphonates and bis(perfluoroalkyl)phosphinates according to Claim 17 or 18 as ionic liquids.

20. Use of the perfluoroalkylphosphonates and bis(perfluoroalkyl)phosphinates according to Claim 17 or 18 as phase-transfer catalyst or surfactants.

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